

high energy electron, ion or x-ray beam. The spectra of a quantity of electrons emitted as a function of their energy reveal information about the chemical environment of the tested material. One of the major uses of AES is the depth profiling of materials, to reveal the thickness (depth) of the oxide layer on the surfaces of materials. These Auger electrons lie in an energy level that extends generally between the low energy level of the emission of secondary electrons up to the energy level of the impinging electron beam. In this region, small peaks will occur in the spectra at certain energy levels that identify the existence of certain elements in the surface.

F1 As used herein, the term "native oxide layer" refers to the layer which extends from the surface of the material to the depth at which the energy of the peak-to-peak oxygen profile as measured in an Auger electron spectrometer decreases by one-half. For example, in the peak-to-peak oxygen profile reproduced in FIG. 5, the thickness of the native oxide layer was 130 Angstroms, which is the depth at which the oxygen profile dropped to half its maximum intensity. Thus, removal of a 130-Angstrom layer from the surface of the titanium body would remove the native oxide layer."

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In The Claims:

Sub K2 11. (Twice Amended) An implant of titanium to be surgically implanted in living bone, comprising:

F2 a threaded portion for engaging bone; and a metal surface from which a native oxide layer had been substantially removed and thereafter acid etched to produce a substantially uniform array of irregularities having peak-to-valley heights not greater than about 10 microns, said acid etched surface being located on at least a part of said threaded portion.

Sub K2 F3 17. (Twice Amended) A dental implant having a head portion, a neck portion, and a threaded portion for contact with bone wherein said head and neck portions are provided with a smooth surface for contact with overlying gingival tissue for blocking

21. infection, and said threaded portion has a roughened region to promote osseointegration with bone while leaving at least one thread turn adjacent said neck portion smooth and unroughened, wherein said implant is titanium or titanium alloy and said roughened region is created by a two-step process in which the native oxide is substantially removed by contact with a first acid solution and followed by etching of the resulting surface with a second acid solution to produce a roughened surface consisting of a substantially uniform array of irregularities having peak-to-valley heights not greater than 10  $\mu\text{m}$ .

22. (Twice Amended) A titanium metal dental implant, comprising:

a head portion for receiving a dental restoration component;  
a threaded portion for engaging bone; and  
a roughened region for facilitating osseointegration with said bone and being located on a part of said threaded portion, said roughened region being uniformly acid etched after a native oxide layer had been removed to produce a substantially uniform array of irregularities having peak-to-valley heights not greater than about 10 microns.

27. (Twice Amended) A titanium implant to be surgically implanted in living bone, comprising:

a head portion having a non-round fitting; and  
a threaded portion including a uniformly roughened titanium metal surface from which a native oxide layer had been substantially removed before being etched to produce a substantially uniform array of irregularities having a peak-to-valley heights ranging from about 0.3 micron to about 10 microns.

34. (Amended) An implant of claim 27, wherein said head portion includes an upper flat surface, a portion of said implant between said upper flat surface and a point